Amendments to the Specification and Abstract:

Please amend the paragraph beginning on line 5 of page 1 as follows:

The present invention relates to a polishing tool for use in a polishing apparatus for polishing a workpiece such as a semiconductor wafer to a flat mirror ~~finish, and more particularly~~ finish. More particularly, the invention relates to a polishing tool such as a fixed abrasive polishing tool or a polishing pad and a method of manufacturing such a polishing tool.

Please amend the paragraph beginning on line 12 of page 1 as follows:

As semiconductor devices have become more highly integrated in recent years, circuit interconnections have become finer and dimensions of devices to be integrated have become smaller. From this point of view, it may be necessary to polish and planarize a surface of a semiconductor wafer to remove a film (layer) formed on the surface of the semiconductor wafer. In order to planarize ~~a~~ the surface of ~~a~~ the semiconductor wafer, a polishing apparatus for performing chemical mechanical polishing (CMP) has been used. This type of chemical mechanical polishing (CMP) apparatus comprises a polishing table having a polishing pad (polishing cloth) attached thereon, and a top ring for holding a workpiece to be polished, such as a semiconductor wafer. The workpiece is disposed between the polishing pad and the top ring, and pressed against the polishing pad under a certain pressure by the top ring while the polishing table and the top ring are rotated. In this state, the workpiece is polished to a flat mirror finish while a polishing liquid (slurry) is supplied onto the polishing pad.

Please amend the paragraph beginning on line 1 of page 4 as follows:

According to a first aspect of the present invention, there is provided a polishing method for polishing a workpiece, ~~comprising:~~ comprising pressing a workpiece against a polishing surface of a polishing tool containing a resin to bring the workpiece into sliding contact with the polishing tool, thereby polishing the workpiece with abrasive ~~particles; wherein at~~ particles. At least a part of the polishing tool is kept at a temperature equal to or

lower than a glass transition temperature of the polishing tool.

Please amend the paragraph beginning on line 9 of page 4 as follows:

According to another aspect of the present invention, there is provided a polishing method for polishing a workpiece, comprising: pressing a workpiece against a polishing surface of a polishing tool containing a resin to bring the workpiece into sliding contact with the polishing tool, thereby polishing the workpiece with abrasive ~~particles; wherein a~~ particles. A processing circumstance is kept at a temperature equal to or lower than a glass transition temperature of the polishing tool. The processing circumstance is defined as a processing point or area (polishing surface), and a medium or a member located around the processing point or area. For example, in the case where the processing point or area is the polishing surface, the medium or the member located around the processing point or area is a polishing liquid, a dressing liquid, a workpiece such as a semiconductor wafer, a dresser, or a processing assistance member.

Please amend the paragraph bridging line 24 of page 4 to line 4 of page 5 as follows:

According to a second aspect of the present invention, there is provided a polishing apparatus for polishing a workpiece, comprising: a polishing tool containing a resin; a holder for holding and pressing a workpiece against the polishing tool to bring the workpiece into sliding contact with the polishing tool, thereby polishing the workpiece with abrasive particles; and a temperature regulating device for keeping the polishing tool at a temperature equal to or lower than a glass transition temperature of the polishing tool.

Please amend the paragraph beginning on line 7 of page 7 as follows:

According to a fourth aspect of the present invention, there is provided a method of manufacturing a polishing tool, comprising: drying a mixed liquid including a resin and chemical agents to form a dried solid material; and compressing and forming the dried solid material with heat into a polishing ~~tool; wherein the~~ tool. The temperature of the

compressing and forming is higher than a glass transition temperature of the resin or a dissolution temperature of the resin.

Please amend the paragraph beginning on line 21 of page 9 as follows:

FIGS. 12A through 12C are cross-sectional views showing a process of heating and compressing a forming material (granulated powder) to form a compact polishing tool;

Please amend the paragraph bridging line 6 of page 10 to line 6 of page 11 as follows:

First, a glass transition temperature (Tg) will be described below. When a thermoplastic ~~macromolecure~~ macromolecule (linear macromolecule) is heated, the linear macromolecule starts thermal motion at a certain temperature, thus changing into a rubber-like state in its entirety. The certain temperature referred to the above is defined as a glass transition temperature. At the glass transition temperature, the linear ~~macromolecure~~ macromolecule changes from a hard brittle state such as a glass-like state to a pliable state. Some resins exhibit fluidity when they are heated to a temperature equal to or higher than the glass transition temperature (Tg). The melting temperature (dissolution temperature) of a macromolecule is generally referred to as a melting point (Tm). The dissolution temperatures of macromolecules are sometimes not definite, and hence need to be distinguished from general melting temperatures. Furthermore, some resins are not melted, but are pyrolyzed or cured. Specifically, a thermoplastic resin, in particular a formed resin (a resin formed of a linear macromolecule), has linear macromolecules intertwined into a solid, like a nonwoven fabric. At temperatures below the glass transition temperature (Tg), the linear macromolecules remain firmly intertwined. Even if external forces are applied to the linear macromolecule at those temperatures, the intertwined structure may be deformed, but is prevented from being disentangled. Therefore, the linear macromolecule is generally highly resistant to external forces. In environments higher than the glass transition temperature (Tg), but lower than temperatures at which linear macromolecules are dissolved, melted, pyrolyzed, or cured, the intersection points where the molecules are intertwined are liable to move.

Please amend the paragraph beginning on line 7 of page 11 as follows:

In a polishing process in which a workpiece such as a semiconductor wafer is pressed against and brought ~~in~~ into sliding contact with a polishing tool composed mainly of a thermoplastic resin, thereby polishing the workpiece with abrasive particles, when the workpiece is polished at a temperature higher than the dissolution temperature of the thermoplastic resin, the polishing tool becomes soft and is less likely to produce scratches on the surface of the workpiece. However, the thermoplastic resin is dissolved and easily attached to the surface of the workpiece being polished. When the workpiece is polished at a temperature higher than the glass transition temperature, the thermoplastic resin changes from a solid state to a viscous state and is easily attached to the surface of the workpiece being polished. If such a thermoplastic resin is actually attached to the polished surface of a semiconductor wafer, then the thermoplastic resin deposit may be dissolved by sulfuric acid with oxygenated water added, hydrochloric acid (35 %aq), or an organic solvent such as acetone or the like, or the outermost surface of the polished wafer may be dissolved by DHF or the like to cause the thermoplastic resin deposit to be removed away. At any rate, a new cleaning process needs to be added, making it difficult to deal with the thermoplastic resin deposit within a short period of time.

Please amend the paragraph bridging line 17 of page 21 to line 15 of page 22 as follows:

FIG. 7B shows a dresser with a retainer temperature regulator. As shown in FIG. 7B, a cooling pipe (temperature regulating pipe) 125 is disposed in a dresser holder 120 and supplied with a cooling liquid (temperature regulating liquid) 127 from a cooling liquid (temperature regulating liquid) supply device (not shown) through a rotary joint 126. An annular retainer 128a made of a high heat transfer material is disposed around an annular dresser tool 121 mounted on the lower surface of the dresser holder 120. The cooling liquid (temperature regulating liquid) 127 flowing through the cooling pipe (temperature regulating pipe) 125 cools the polishing surface of the polishing tool 10 or regulates the

temperature of the polishing surface of the polishing tool 10 through the dresser holder 120. Therefore, the dresser shown in FIG. 7B is capable of cooling the polishing surface of the polishing tool 10 or regulating the temperature of the polishing surface of the polishing tool 10 while dressing the polishing tool 10 with the dresser tool 121. Because the dresser tool 121 ~~is of~~ has a ring shape and has a small area of contact with the polishing tool 10, the retainer 128a should preferably comprise a highly flat member having a flatness of 0.1 mm or less. The ring-shaped retainer 128a is effective to stabilize the ring-shaped dresser tool 121 in operation and also to condition the polishing surface of the polishing tool 10 which has been excessively roughened by dressing. The surface of the retainer 128a which is held in contact with the polishing tool 10 may have a radial, concentric, spiral, or grid-like pattern of grooves for draining the waste dressing liquid.

Please amend the paragraph bridging line 13 of page 30 to line 9 of page 31 as follows:

The polymeric material may be in the form of either a powder or a liquid. In order to ~~uniformize~~ make the composition ratio of a granulated powder as a forming material uniform and increase the uniformity of the fixed abrasive, it is preferable to use a latex suspension where the polymeric material is uniformly dispersed in a liquid. For use in semiconductor ~~applications, i.e.~~ applications (i.e., for polishing semiconductor wafers with reduced metal ~~contamination~~ contamination), the amount of any metals contained in the polymeric material should be as small as possible. The thermoplastic material is generally manufactured by polymerizing many monomers through different processing stages including addition polymerization, copolymerization, condensation polymerization, addition condensation, etc. In those processing stages, water and various agents including polymerization catalysts represented by organometallic compounds and inorgannometallic compounds, polymerization-retarders, dispersing agents, activators, solvents, catalyst deactivators, stabilizers, emulsifiers, antioxidants, etc are used. The monomers are processed into the polymeric material through a complex process. In order to reduce the amount of metals introduced into the polymeric material of the polishing tool, it is preferable

to reduce the metal compounds contained in the chemical agents and water used in the above various polymerization stages. The water and solvents that are used in the polymerization process should preferably comprise pure water or ultrapure water and highly pure solvents, respectively.

Please amend the paragraph beginning on line 21of page 31 as follows:

A process of manufacturing a fixed abrasive polishing tool will be described below.

Please amend the paragraph bridging line 23 of page 31 to line 3 of page 32 as follows:

First, a fixed abrasive material powder is manufactured by mixing fine abrasive particles, a polymeric material, and additives including a dispersing agent such as a surface active agent, a stabilizer such as a buffer, an accelerator represented by a pH adjuster such as KOH, a mirror-finish improver such as a ~~macromolecure~~ macromolecule agent, etc. The above materials are mixed with each other, and, if necessary, pure water and a solvent are added to the mixture. The materials are sufficiently dispersed using a stirrer, an ultrasonic dispersing device, or the like.

Please amend the paragraph bridging line 17 of page 33 to line 21 of page 34 as follows:

Undue gaps between the segments pose a problem in that when the semiconductor wafer is polished by the fixed abrasive polishing tool, the area of contact between the polishing tool and the semiconductor wafer tends to vary. Because it is difficult to instantaneously change the pressure applied to the semiconductor wafer at the time that the semiconductor wafer is polished, a change in the area of contact between the polishing tool and the semiconductor wafer causes a change in the pressure applied to the semiconductor wafer, failing to keep the amount of material removed from the semiconductor wafer ~~stably~~ stable. When the semiconductor wafer is positioned across gaps between the segments upon relative movement of the semiconductor wafer and the

polishing tool, a large force is imposed on the semiconductor wafer, tending to polish the semiconductor wafer to an excessively large amount on the edge portion thereof or to produce scratches on the surface of the semiconductor wafer. In order to solve the above drawbacks, the segments of the fixed abrasive are of cyclotomic shapes or sectorial shapes with gaps controlled therebetween, so that the segments can be positioned accurately with relative ease and the fixed abrasive can polish the semiconductor wafer stably. The segment-shaped fixed abrasive is also advantageous in that there is no need for handling a large-sized fixed abrasive which would tend to be damaged when manufactured, and the danger of inclusion of air bubbles into the adhesive layer used to bond the fixed abrasive to the base is comparatively small. The inclusion of air bubbles into the adhesive layer produces a non-bonded area in the layer below the polishing surface to cause the fixed abrasive to be insufficiently fixed to the base. If the fixed abrasive is not sufficiently bonded to the base, then the polishing tool may possibly be separated from the base under frictional forces developed between the polishing tool and the semiconductor wafer being polished, causing damage to the fixed abrasive.

Please amend the paragraph bridging line 22 of page 34 to line 1 of page 35 as follows:

The base, which ~~is of~~ has a circular or cylindrical shape, is made of an aluminum alloy or engineering plastics, if the fixed abrasive has a size up to a diameter of about 600 mm. The fixed abrasive assembly thus constructed is sufficiently strong and has a weight that can easily be handled. Generally, a rotatable thick fixed abrasive for use as a polishing tool for polishing 8-inch semiconductor wafers can be manufactured by the above manufacturing process.

Please amend the paragraph bridging line 13 of page 39 to line 9 of page 40 as follows:

The polymeric material may be in the form of either a powder or a liquid. In order to ~~uniformize~~ make the composition ratio of a granulated powder as a forming material

uniform and increase the uniformity of the fixed abrasive, it is preferable to use a latex suspension where the polymeric material is uniformly dispersed in a liquid. For use in semiconductor ~~applications, i.e.~~ applications (i.e., for polishing semiconductor wafers with reduced metal ~~contamination~~ contamination), the amount of any metals contained in the polymeric material should be as small as possible. The thermoplastic material is generally manufactured by polymerizing many monomers through different processing stages including addition polymerization, copolymerization, condensation polymerization, addition condensation, etc. In those processing stages, water and various agents including polymerization catalysts represented by organometallic compounds and inorgannometallic compounds, polymerization-retarders, dispersing agents, activators, solvents, catalyst deactivators, stabilizers, emulsifiers, antioxidants, etc are used. The monomers are processed into the polymeric material through a complex process. In order to reduce the amount of metals introduced into the polymeric material of the polishing tool, it is preferable to reduce the metal compounds contained in the chemical agents and water used in the above various polymerization stages. The water and solvents that are used in the polymerization process should preferably comprise pure water or ultrapure water and highly pure solvents, respectively.

Please amend the paragraph bridging line 28 of page 40 to line 1 of page 41 as follows:

A process of manufacturing a fixed abrasive polishing tool will be described below with reference to FIGS. 9 through 13A and 13B.

Please amend the paragraph beginning on line 11of page 41 as follows:

Next, a manufacturing process of the fixed abrasive polishing tool will be described in a concrete manner in detail.